

CONFIRMATORY FACTOR ANALYSIS OF CUSTOMER EXPERIENCE METRICS IN U.S. RETAIL CHAINS USING SPSS

1. Background and Problem Statement

A national U.S. retail chain with hundreds of stores and an extensive online presence had introduced a new framework to measure customer experience (CX) based on three latent constructs: **Service Quality**, **Product Value**, and **Brand Loyalty**. Each of these constructs was measured using multiple items collected via structured customer surveys. While internal analysts had grouped these items theoretically, leadership required statistical validation of this three-factor structure before embedding it into business intelligence dashboards and strategic KPIs. The company engaged SPSS-based Confirmatory Factor Analysis (CFA) to statistically verify the proposed CX model.

2. Objectives

- To validate a predefined three-factor model of customer experience using SPSS CFA
- To assess the model fit using multiple goodness-of-fit indices (CFI, RMSEA, TLI, Chi-square)
- To identify cross-loadings or poorly performing items for possible revision or removal
- To provide recommendations for improved measurement and integration into customer satisfaction dashboards

3. Methodology

3.1 Data Description

- Source: Customer feedback survey (post-purchase)
- Sample Size: 1,200 respondents (equal split from online and in-store customers)
- Items: 12 questions mapped to 3 factors (4 items per factor), each rated on a 7-point Likert scale
- Constructs:
 - *Service Quality*: responsiveness, courtesy, clarity, problem-solving
 - *Product Value*: price fairness, product range, quality perception, availability

- *Brand Loyalty*: repeat intention, recommendation likelihood, emotional connection, brand preference

3.2 Software and Tools

- SPSS v29
- AMOS plugin for CFA
- Syntax-based model specification for greater control over parameters

3.3 CFA Steps in SPSS

- Model specification using path diagram and syntax
- Maximum Likelihood estimation method
- Assessment of model fit through:
 - Chi-square / df ratio
 - Comparative Fit Index (CFI)
 - Tucker-Lewis Index (TLI)
 - Root Mean Square Error of Approximation (RMSEA)
- Factor loading threshold: ≥ 0.60
- Modification Indices reviewed to explore any necessary model refinements

4. Results

- **Model Fit:**
 - Chi-square/df = 2.45 (acceptable)
 - CFI = 0.94, TLI = 0.91 → good fit
 - RMSEA = 0.052 → acceptable
- **Factor Loadings:**
 - 11 of 12 items loaded above 0.70
 - One loyalty item (“emotional connection”) had a loading of 0.52
- **Correlation between factors:**
 - Moderate to high correlations (ranging 0.48 to 0.67), no multicollinearity detected
- **Reliability:**

- Cronbach's Alpha for all three constructs > 0.80
- Composite Reliability values ranged from 0.83 to 0.87

5. Interpretation and Insights

- The CFA confirmed the proposed three-factor structure with acceptable fit
- “Emotional connection” item underperformed and may need rephrasing or anchoring clarification
- Factors were distinct but related, indicating that while constructs are conceptually linked, each captures a unique dimension of customer experience
- Online and in-store sub-group analyses showed no significant metric invariance, enabling standardized use of the scale across formats

6. Recommendations

- Retain the current three-factor model for dashboard reporting
- Modify or re-test the “emotional connection” item in the next survey round
- Use factor scores to track quarterly CX trends by location and customer type
- Train customer service teams on subdimensions that most strongly impact loyalty and satisfaction

7. Deliverables

- CFA syntax and AMOS output files
- A structured interpretation report with tables, diagrams, and model summary
- PowerPoint-ready charts for internal presentation
- Recommendations for scale refinement and integration with BI tools

8. Stakeholder Relevance

Academic Use:

- A complete example of applying Confirmatory Factor Analysis for validating measurement scales
- Useful in consumer behavior, survey design, and marketing analytics courses

Corporate Use:

- Practical validation of CX metrics using empirical data
- Supports standardization of KPIs across departments and reporting platforms

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